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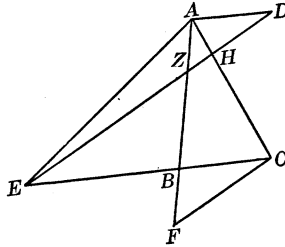
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II. A GEOMETRICAL ILLUSTRATION OF THE FORM ∞/∞ .

By JAMES H. WEAVER, High School, West Chester, Pa.

In the AMERICAN MATHEMATICAL MONTHLY, Vol. XXIII (1916), pp. 41-44, Professor Lovitt has given some interesting illustrations of indeterminate forms. The following is an example of the form ∞/∞ and involves the invariance of cross-ratio. The example and the proof have been taken from Pappus.¹ Some



slight modifications in the statement and proof of the theorem have been made to suit the present needs.

THEOREM. *Let there be four lines, AE , AB , AC and AD concurrent in A , and let these be cut by a line $EZHD$ and let EBC be drawn parallel to AD . Then $ED \cdot ZH : EZ \cdot DH = CB : BE$.*

Proof. Through C draw CF parallel to ED , cutting AB produced in F . Since CF is parallel to HZ , $CA : AH = CF : ZH$, and since EC is parallel to AD , $CA : AH = ED : DH$. Therefore $ED : DH = CF : ZH$ and $ED \cdot ZH = CF \cdot DH$. Hence

$$\begin{aligned} ED \cdot ZH : EZ \cdot DH &= CF \cdot DH : EZ \cdot DH, \\ &= CF : EZ, \\ &= CB : BE. \end{aligned}$$

Now AD and BC will intersect at infinity and because of the invariance of the cross-ratio under a projective transformation, we have

$$ED \cdot ZH : EZ \cdot DH = CB \cdot \infty : BE \cdot \infty.$$

In this connection it is interesting to note that the above theorem is the foundation for the celebrated Configuration of Pappus.²

RELATING TO THE MECHANICAL TRISECTION OF AN ANGLE.

By BERNHART INGIMUNDSON, Student in the University of Manitoba.

Note.—Interest in the trisection problem is perennial. It was old in the time of Plato and is new today. It is probably worth while to republish solutions occasionally in order to remind readers that the problem is readily solvable by means other than ruler and compass. Trisection

¹ Pappus Alexandrinus, *Collectio*, ed. Hultsch, p. 882.

² Cf. Veblen and Young, *Projective Geometry*, Vol. I, p. 99.